Claims

1. A method for generating an atomic clock signal with coherent population trapping from a first and a second phase-coherent laser wave, each substantially in resonance with an optical transition of the atoms of an interactive medium, the coherent superimposition of the atomic states corresponding to the coherent population trapping of atoms producing a response signal having a resonance-extremal amplitude and representing the atomic clock signal corresponding to the variation in amplitude of the signal detected as a function of the value of the difference in frequency of the first and the second phase-coherent laser wave, wherein said method consists at least in modulating in synchronization by successive pulses the intensity of the first and the second laser wave, by a shape factor determined between a high level and a low level of intensity, the interaction between the first or the second laser wave respectively and the interactive medium being substantially limited to the duration of each successive pulse corresponding to a high level of intensity, said response signal produced during a current pulse depending on the atomic state produced during at least one pulse preceding this current pulse and on the development of this atomic state for the duration of a low level of intensity separating said pulses; and detecting and superimposing by linear combination said response signal produced during said current pulse and at least one pulse preceding this current pulse to produce a resultant compensated atomic clock signal, the spectral width of which is minimized.

2. The method as claimed in claim 1, wherein the pulse modulation is carried out by pulse trains, the frequency of the modulation pulses being between 0.2 Hz and 10^4 Hz.

3. The method as claimed in either claim 1 or claim 2, wherein the modulation pulses have a shape factor of between 10^{-6} and 10^{-1}.

4. The method as claimed in any one of claims 1 to 3, wherein the duration of a low level of intensity separating said current pulse from said pulse preceding this current pulse is shorter than the lifetime of the hyperfine coherence existing between two clock levels.

5. The method as claimed in any one of claims 1 to 4, wherein said interactive medium is formed by a plurality of thermal or laser-cooled atoms.

6. The method as claimed in any one of claims 1 to 5, wherein the step consisting in detecting said clock signal is chosen as one of the detection processes from among the group of detection processes comprising optical absorption, optical fluorescence, microwave detection, as a function of the difference in frequency of the first and the second phase-coherent laser waves.

7. The method as claimed in any one of the preceding claims, wherein said method consists in replacing one of the laser waves for exciting the interactive medium with a radiofrequency signal, the frequency of which is substantially equal to the transition frequency of the atoms of the interactive medium, said method consisting in modulating by successive pulses either the maintained laser wave or the maintained laser wave and the radiofrequency signal.

8. An atomic clock with pulsed interrogation, comprising at least an optical interrogation means allowing the production of a first and a second phase-coherent laser beam, each substantially in resonance with an optical transition of the atoms of an interactive medium; an interactive cell comprising said interactive medium, illuminated in operation by the first and the second phase-coherent laser beam, to produce a response signal having a resonance-extremal amplitude and corresponding to the variation in amplitude of the signal detected as a function of the difference in frequency of the first and the second phase-coherent laser beam; means for detecting said response signal, said detection means being adapted to the wavelength and to the amplitude of the response signal, wherein said atomic clock further comprises means for pulse-modulating the intensity of the first and the second laser beam between a high level and a low level of intensity, said modulation means being placed on the path of said first and second laser beams upstream of said interactive cell to produce in synchronization a first and a second pulsed laser beam, the interaction between the first or the second laser beam respectively and the interactive medium being substantially limited to the duration of each successive pulse corresponding to a high level of intensity, said response signal produced during a current pulse being dependent on the atomic state produced during

at least one pulse preceding this current pulse and on the development of this atomic state for the duration of a low level of intensity energy separating said pulses, and wherein said detection means further comprise means for adding by linear combination the response signal produced during this current pulse and the response signal produced during at least one pulse preceding this current pulse, said means for adding by linear combination allowing the production of a resultant compensated atomic clock signal, the spectral width of which is minimized.

9. The atomic clock as claimed in claim 8, wherein said means for pulse-modulating the intensity of the first and the second laser beam between a high level of intensity and a low level comprise at least one acousto-optic modulator.

10. The atomic clock as claimed in either claim 8 or claim 9, wherein said detection means further comprise means for sampling the response signal produced during the interaction of the current pulse and at least one pulse preceding this current pulse; and means for storing sampled values of the response signal produced during the interaction of each of said pulses.

11. The atomic clock as claimed in claim 10, wherein said detection means further comprise means for reading the values sampled at predetermined instants stored in said storage means; and means for calculating a linear combination of said stored sampled values allowing the production of said compensated atomic clock signal.

12. The atomic clock as claimed in any one of claims 8 to 11, wherein one of the laser beams is replaced by a radiofrequency signal, the maintained laser beam or the maintained laser beam and the radiofrequency signal being subjected to modulation by successive pulse trains.